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**Datasheet for the decision
of 15 December 2010**

Case Number: T 0849/08 - 3.3.03

Application Number: 01124523.0

Publication Number: 1197505

IPC: C08G 18/10

Language of the proceedings: EN

Title of invention:

Optical lens formed by casting a polyurethane resin composition

Patentee:

Talex Optical Co., Ltd.

Opponent:

PPG Industries, Inc.

Headword:

-

Relevant legal provisions:

EPC Art. 54, 56, 84, 123(2)

Keyword:

"Main request- inventive step -(no) "

"First, second auxiliary requests - added subject matter - (yes) "

"Third auxiliary request- maintenance in amended form - (yes) "

Decisions cited:

G 0007/93, T 0201/83, T 0640/91, T 1002/92, T 1008/96

Catchword:

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Case Number: T 0849/08 - 3.3.03

DECISION
of the Technical Board of Appeal 3.3.03
of 15 December 2010

Appellant: Tallex Optical Co., Ltd.
(Patent Proprietor) 5-6, Tajima 4-chome
Ikuno-ku
Osaka (JP)

Representative: Grünecker, Kinkeldey
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Respondent: PPG Industries, Inc.
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Representative: Polypatent
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office dated 13 February 2008
and posted 17 March 2008 revoking European
patent No. 1197505 pursuant to Article
101(3)(b) EPC.

Composition of the Board:

Chairman: R. Young
Members: M. Gordon
C. Vallet

Summary of Facts and Submissions

I. Mention of the grant of European Patent No. 1 197 505 in the name of Talex Optical Co., Ltd. in respect of European patent application No. 01124523.0 filed on 12 October 2001 and claiming a priority date of 13 October 2000 from JP 2000313704 was announced on 7 September 2005 (Bulletin 2005/36) on the basis of 5 claims which read as follows:

1. An impact-resistant optical lens formed by casting the polyurethane resin composition comprising a polyisocyanate, a polyhydroxy compound and an aromatic polyamine, wherein said polyisocyanate is 4,4'-methylene-bis(cyclohexyl isocyanate) or isophorone diisocyanate.
2. The optical lens as claimed in claim 1 wherein said polyhydroxy compound is a polyether diol or a polyester diol having an average molecular weight of 700-1200 or their mixture.
3. The optical lens as claimed in claim 1 wherein said aromatic polyamine is 4,4'-methylene-bis(2-chloroaniline).
4. The optical lens as claimed in-claim 1 wherein said polyisocyanate and said polyhydroxy compound are reacted so that the reaction molar ratio of said polyisocyanate to said polyhydroxy compound (NCO/OH) is 2.5 to 4.0 and the NCO content of a polyurethane prepolymer obtained is 7.0 to 14.0%.
5. An impact-resistant optical lens as claimed in claim 1 wherein it is a transparent lens, sunglass lens or polarized lens.

II. A notice of opposition to the patent was filed on 2 June 2006 by PPG Industries, Inc. invoking the grounds of opposition pursuant to Art. 100(a) EPC (lack of novelty, lack of inventive step), 100(b) EPC (lack of sufficiency of disclosure) and Art. 100(c) EPC (extension of the subject matter of the patent beyond the content of the application as filed).

Inter alia the following documents were cited in support of the opposition:

D1: US-A-6 127 505

D3: US-A-3 866 242.

During the course of the opposition proceedings the opponent cited, with a letter dated 22 May 2007, a further document:

D4: JP-A-9 258 009 and an English language translation thereof.

III. In a decision dated 13 February 2008 and issued in writing on 17 March 2008 the opposition division revoked the patent.

The decision was based on three sets of claims forming a main request, having two claims and first and second auxiliary requests each having four claims, all three requests having been filed with a letter dated 11 December 2007.

Claim 1 of the main request was directed to an impact-resistant polarized optical lens formed by casting a polyurethane resin and read as follows:

1. An impact-resistant polarized optical lens formed by casting ^a ~~the~~ polyurethane resin composition comprising a polyisocyanate, a polyhydroxy compound and 4,4'-methylene-bis(2-chloroaniline), wherein said polyisocyanate is 4,4'-methylene-bis(cyclohexyl isocyanate) or isophorone diisocyanate; and

wherein said polyisocyanate and said polyhydroxy compound are reacted so that the reaction molar ratio of said polyisocyanate to said polyhydroxy compound (NCO/OH) is 2.5 to 4.0 and the NCO content of a polyurethane prepolymer obtained is 7.0 to 14.0%.

For the purposes of the decision the opposition division treated this claim (and the corresponding claims of the first and second auxiliary requests) as having been amended by replacing the term "a polyurethane resin" by "**the** polyurethane resin" (emphasis of the Board) in order to address an objection pursuant to R. 80 EPC (cf section 2.1 of the decision of the opposition division).

Claim 2 of the main request was directed to a preferred embodiment and corresponded to the subject matter of claim 2 of the patent as granted (see section I, above).

The details of the first and second auxiliary requests are not relevant for the present decision.

According to the decision of the opposition division:

- (a) D4 was admitted to the proceedings:
 - Claim 1 had been amended during the course of the opposition proceedings to be directed to "a polarized lens";
 - D4 disclosed how polarized lenses were prepared and hence was *prima facie* highly relevant.
- (b) With respect to Art. 123(2) EPC for the main request the decision held:
 - The subject matter of claim 1 was a combination of the subject matter of claims 1 and 3-6 as originally filed;
 - Thus the requirements of Art. 123(2) EPC were satisfied.
- (c) The claims of all requests met the requirements of Art. 83, 84 and 123(3) and R. 80 EPC (subject to the above mentioned amendment).
- (d) The subject matter of the main request was novel:
 - D1 did not disclose the required chain extender (4,4'-methylene bis (2-chloroaniline) - hereinafter "MOCA") or the formation of a polarized lens;
 - D3 disclosed optically clear polyurethanes for protective shields, more particularly for optical ballistic shields, glazings for buildings and vehicles, riot shields, face shields and clipboards. D3 disclosed MOCA as the chain extender;

- D4 disclosed the production of polarized lenses, but did not employ the specific combination of isocyanates with MOCA.
- (e) Inventive step was analysed starting from each of D1 or D3 as the closest prior art. Whilst D1 related to lenses but did not disclose the required diamine (MOCA), D3 disclosed the same composition however employed this not for a lens but for bullet proof shields, face shields or windshields.

With respect to D3 as the closest prior art:

- The composition of D3 was suitable for the production of impact resistant transparent optical applications;
- It was however clear from D1 that impact resistant, transparent optical applications included lenses. Further D1 referred to D3;
- The technical problem with respect to D3 was to provide a further use for the polyurethane composition of D3;
- It was obvious to apply the composition of D3 - being identical to that specified in the operative claim 1 of the patent in suit - to the production of lenses. Moreover it was obvious to apply the composition in the manufacture of polarized lenses since the manufacture of polarized lenses from a lens material was state of the art as shown by D4.

Alternatively, based on D1 as the closest prior art:

- D1 disclosed impact resistant lenses from a similar polyurethane lens material;

- The objective technical problem was to provide an alternative polyurethane material for impact resistant polarized optical lenses;
 - The skilled person was motivated to look into D3 for alternative polyurethane materials for this purpose;
 - Firstly, D3 was mentioned in D1;
 - Secondly, D3 concerned the same polyurethane composition as D1 but a different chain extender (MOCA) which also led to impact resistant transparent polyurethanes with good optical properties, i.e. low haze as shown by example 1 of D3;
 - An additional motivation to consider D3 was that D1 mentioned that polyurethanes for lenses had the same optical and mechanical properties as the polyurethanes used for glazing, riot shields and face masks;
 - The longer pot life found by using MOCA as the chain extender compared with the amines used in D1 was merely an additional benefit or bonus effect;
 - Consequently it was obvious to apply polyurethanes of D3 in the manufacture of lenses and in particular polarized lenses, the manufacture of such lenses being state of the art as shown by D4.
- (f) The subject matter of the auxiliary requests also did not satisfy the requirements of Art. 56 EPC.
- (g) Accordingly the patent was revoked.

IV. A notice of appeal against the decision was filed on 23 April 2008 by the patent proprietor, the prescribed fee being paid on the same day.

V. The statement of grounds of appeal was received on 28 July 2008 accompanied by:

- Nine sets of claims forming a main request and first to eighth auxiliary requests and
- Four "Enclosures" designated "Enclosure A" to "Enclosure D" whereby:
 - Enclosure A was a copy of the letter dated 11 December 2007, submitted during the opposition proceedings (cf section III, above). The text of this letter contained *inter alia* a report of some further examples;
 - Enclosures B and C were stated to provide evidence of the commercial success of the lenses produced by the patent proprietor;
 - Enclosure D was a further experimental report.

(a) The late filed document D4 could not be considered admissible in view of the established practice of the European Patent Office concerning late filing of documents under due consideration of Art. 114 EPC:

- D4 was not relevant as it was neither used in the evaluation of novelty nor did D4 constitute the closest prior art in the evaluation of inventive step;
- The decision under appeal only considered D4 in the context of technological background information;

- The disclosure of D4 was very unspecific referring to a broad variety of polymeric materials as well as a variety of preparation methods for the devices therein disclosed;
- The argument of the opponent that the filing of D4 had been necessitated by the submission of unforeseen amendments was invalid since the amendment to claim 1 merely involved features that had already been present in the set of - only five - claims as granted.

(b) The main request corresponded to the main request considered in the decision under appeal however with the term "**a** polyurethane resin" amended to read "**the** polyurethane resin" so that the claim conformed in wording to that which the opposition division had treated the claim as having (see section III, above).

The first auxiliary request differed from the main request in specifying the range for the viscosity of the polyurethane polymer (750 to 2100 mPa.s at 60°C). The second auxiliary request corresponded to the first auxiliary request, whereby claims 1 and 2 had been combined. Accordingly the second auxiliary request had only a single claim. The details of the other requests are not relevant to this decision.

(c) With regard to the technological background:

- In contrast to the disclosure of D1 the inventors had determined that a specific chemical composition for the material yielding the polyurethane resin for the polarized lens was required;

- Enclosure A showed that the composition according to the patent in suit provided longer pot life;
- This aspect had been neglected in the decision of the opposition division;
- Pot life was an important technical feature since only suitably long pot lives allowed slow production processes, which were required in the preparation of polarizing lenses in a mould in order to avoid damage or distortion of the polarizing film.

(d) With regard to inventive step, D3 as selected by the opponent (see also section III.(e), above) could not represent the closest prior art as it did not relate to impact resistant polarized lenses but to protective shields. Even if D3 were nevertheless to be considered it would not render the claimed subject matter obvious:

- It contained no suggestion that the material therein disclosed could be employed to provide polarized lenses with the improved properties as demonstrated by the examples of the patent in suit;
- Neither D1 nor D4 suggested to employ the materials of D3 to prepare polarized lenses.

Considering D1 as the closest prior art:

- D1 referred to an impact resistant polyurethane and method for preparing same;
- D1 differed from the claimed subject matter in that neither polarized lenses, nor lenses

formed from the specific polyurethane resin defined in operative claim 1 were disclosed;

- The objective problem underlying the patent in suit was the provision of improved polarized lenses made from a polyurethane resin;
- The advantage of the composition of the invention was the good balance of properties, especially the highly desirable pot life of 35 to 60 minutes as shown in the examples;
- The aromatic amines taught by D1 resulted in compositions with unsatisfactory processing properties, in particular unsuitably short pot lives, and hence were not suitable for the preparation of a polarized lens with the desired quality, as shown by the examples of the patent in suit;
- D4 did not contain any reference to a specific polyurethane composition which had been used in accordance with the present invention to prepare improved polarized optical lenses.

(e) The viscosity range specified in the first auxiliary request complied with the requirements of Art. 123(2) EPC since:

- This range had to be considered as a general feature of the disclosure of the invention;
- It was not linked to the specific conditions as defined in the examples;
- The comparative examples of the patent in suit had either higher or lower viscosities than defined in the first auxiliary request;

- The discussion on page 5 of the granted patent identified this viscosity range as highly suitable for producing optical lenses, in particular polarized lenses.

Regarding inventive step of the first auxiliary request:

- The patent showed that the preparation of high quality lenses could be carried out using the polyurethane compositions falling within the newly specified viscosity range;
 - In contrast, as shown by the additional experiments submitted (Enclosure D), the compositions of D1 and D3 gave rise to unsatisfactory lenses since either resin flow broke down or the resin flow was so viscous that bubbles remained, rendering the lenses useless.
- (f) These arguments applied also to the second-eighth auxiliary requests.

VI. The opponent - now the respondent - replied with a letter dated 5 December 2008.

- (a) Five further documents, designated D5-D9 were submitted, *inter alia*:

D5: Voelker, Th; Balling, P. "A New Non-Toxic Replacement for Methylene-Bis-o-Chloroaniline (MBOCA)-4,4'-Methylene-Bis-(3-Chloro-2,6-Diethylaniline)-MCDEA", Journal of Elastomers and Plastics, vol. 19, July 1987, pages 219-230.

- (b) The opposition division had exercised their discretion to admit D4 and considered it to be

relevant. D4 had been employed in the reasoning of the decision.

(c) Regarding Art. 83 EPC:

- As was apparent from Enclosure D (filed with the statement of grounds of appeal - see section V, above) the composition of example 1 of D3 fulfilled all the compositional requirements of the operative claim;
- Although the appellant/patent proprietor considered the viscosity to be an essential difference between the subject matter of the patent in suit and example 1 of D3, claim 1 of the main request did not have any restriction with respect to viscosity;
- Thus example 1 of D3 disclosed a polyurethane casting composition according to the main request;
- Enclosure D however showed that such a composition was not suitable to produce polarized lenses due to extensive bubble formation;
- Hence the patent proprietor itself had provided evidence that the subject matter of claim 1 of the main request could not be made within the entire scope claimed.

(d) With regard to inventive step, the closest prior art was D3 since this disclosed the resin composition employed in the claims and casting processes for making articles therefrom:

- The objective technical problem solved was to find a different use for the composition known from D3;

- The features "polarized" and "lens" were independent and "polarized" was independent of the resin composition;
- D4 showed that it was well known how to prepare a polarized lens in a casting process;
- The skilled person was aware of D1 especially since it referred to D3;
- D1 disclosed that optically clear polyurethane compositions known from D3 could alternatively be used for lenses or protective shields;
- Hence it was evident to use the composition of D3 in a casting process to make polarized lenses;
- Since the polarized lens was the inevitable product of that process the lens itself also could not be inventive.

D1 did not represent a valid closest prior art (cf submissions of appellant/patent proprietor reported in section V.(c) above):

- The evidence of the appellant/patent proprietor showed that when employing a polyurethane resin within the limits of claim 1 of the main request but outside a specific viscosity range useful lenses could not be obtained;
- The only remaining technical problem was to provide an alternative crosslinker compared to the teaching of D1;

- As D1 referred explicitly to D3 it was obvious to substitute the crosslinker known from D1 by the crosslinker known from D3;
 - Regarding the argument of the appellant/patent proprietor concerning the increased pot life of the MOCA curing agent, D5 taught in the production of elastomers, that MOCA provided higher pot life than the curing agents known from D1;
 - The main drawback of MOCA was toxicity and carcinogenicity;
 - Consequently starting from D1 it was obvious to substitute the crosslinker of D1 by MOCA in order to make a polarized lens.
- (e) The first and second auxiliary requests did not meet the requirements of Art. 123(2) EPC due to the specification of the viscosity:
- There was no general teaching in the application as filed with regard to viscosity requirements;
 - Only the single viscosities of each of the examples were disclosed;
 - The examples showed that the viscosity depended strongly on the explicit conditions of the examples and could not be generalised independently of the other restrictions of the examples.
- (f) Numerous objections were raised with respect to the claims of the third-eighth auxiliary requests which are however not relevant for the present decision.

VII. Together with a letter dated 25 May 2010 the appellant/patent proprietor submitted 24 sets of claims forming a main request and 1st-23rd auxiliary requests.

The main request and first and second auxiliary requests were stated to be identical to those filed together with the statement of grounds of appeal (see section V, above).

The third auxiliary request was stated to be based on the main request whereby claims 1 and 2 had been combined and in which furthermore the polyhydroxy compound had been limited to a polyether diol, i.e. one of the two embodiments of claim 2 of the previous main request.

The sole claim of the third auxiliary request therefore read as follows:

1. An impact-resistant polarized optical lens formed by casting the polyurethane resin composition comprising a polyisocyanate, a polyhydroxy compound and 4,4'-methylene-bis(2-chloroaniline), wherein said polyisocyanate is 4,4'-methylene-bis(cyclohexylisocyanate) or isophorone diisocyanate,

wherein said polyisocyanate and said polyhydroxy compound are reacted so that the reaction molar ratio of said polyisocyanate to said polyhydroxy compound (NCO/OH) is 2.5 to 4.0 and the NCO content of a polyurethane prepolymer obtained is 7.0 to 14.0%, and

wherein said polyhydroxy compound is a polyether diol having an average molecular weight of 700-1200 or their mixture.

The details of the further sets of claims are not relevant to the present decision.

- (a) The appellant/patent proprietor maintained its objection to the admissibility of D4 and raised objections to the admissibility of D5-D9.
- (b) Concerning the submissions of the respondent/opponent with regard to Art. 123(2) EPC in respect of the viscosity range introduced *inter alia* into the first and second auxiliary requests

(see section VI.(e), above), reference was made to the corresponding argumentation in the statement of grounds of appeal (see section V.(e), above).

- (c) With regard to sufficiency of disclosure *inter alia* of the main and first and second auxiliary requests (see submissions of the respondent/opponent reported in section VI.(c), above) reference was made to the findings of the opposition division (see section III.(c), above).
- (d) Regarding sufficiency of disclosure *inter alia* of the third auxiliary request wherein the polyhydroxy compound had been restricted to polyether diols, and the submissions of the respondent/opponent with respect to the experimental evidence of Enclosure D (see section VI.(c), above) the appellant/patent proprietor submitted:

- The differences in the viscosities disclosed in "Test Example 1" and "Test Example 2" of Enclosure D (reflecting Example IV of D1 and Example 1 of D3 and of "Control Test Example 1" of Enclosure D (reflecting example 2 of the patent in suit) were correlated to the fact that "Test Example 1" and "Test Example 2" employed a polyester diol whereas "Control Test Example 1" employed a polyether diol;
- If other manufacturing conditions were identical the viscosity was lower in the case of a polyether diol compared to a polyester diol;
- In view of this it was apparent that the claims *inter alia* of the third auxiliary

request satisfied the requirements of Art. 83 EPC.

- (e) Regarding inventive step, reference was made, with regard to the choice of the closest state of the art, to the submissions in the statement of grounds of appeal (see section V.(d), above).

Further:

- Enclosure A showed that the compositions of the invention had longer pot lives which was crucial to produce polarized lenses with the desired quality;
 - This showed that favourable properties of the polarized lenses were directly linked with the material properties;
 - D5, submitted by the respondent/opponent (see section VI.(a), above) did not relate to polarized lenses;
 - With respect *inter alia* to the third auxiliary request and the limitation to polyether diols of the specified average molecular weight, D1 and D3 did not suggest specifically using a polyether diol.
- (f) Regarding the submissions of the respondent/opponent:
- D3 was not the closest prior art, reference being made to the statement of grounds of appeal (see section V.(d), above);
 - With respect to the submissions of the respondent/opponent concerning D4 (see section VI.(d), above), it was emphasised that specific chemical compositions were required in order to obtain polarized lenses with high reliability;

- Enclosure A showed that compositions according to the patent in suit provided longer pot lives, which was crucial to produce polarized lenses with the required quality.

VIII. Together with a letter dated 2 June 2010 the appellant/patent proprietor filed high quality copies of photos originally attached to Enclosure D as filed with the statement of grounds of appeal.

IX. On 20 August 2010 the Board issued a summons to attend oral proceedings together with a communication setting out its preliminary, provisional opinion.

- (a) The main request and all auxiliary requests failed to meet the requirements of Art. 123(2) EPC due to the omission of the term "for casting". This term was essential since according to pages 2, lines 43-46 of the application (A1 publication) the term "for casting" had to be understood that first an isocyanato functional prepolymer was obtained by reacting an alicyclic polyisocyanate with a polyhydroxy compound and the composition for casting contained this prepolymer and a polyamine crosslinker.
- (b) With respect to the main request and the objections raised pursuant to Art. 83 and 56 EPC:
 - Claim 1 was directed to an impact resistant polarized optical lens formed by a particular process;
 - Whilst the patent in suit referred to qualities of the resulting lens, the only effects quantitatively demonstrated were the viscosity of the prepolymer and its pot life

neither of which was a characteristic of the lens;

- Thus it would be necessary to discuss to what extent the indicated phenomena implied a relevant effect in relation to the product of claim 1.
- (c) With respect to *inter alia* the first and second auxiliary requests an objection pursuant to Art. 123(2) EPC was raised in respect to the specified viscosity range. With reference to T 201/83 (OJ EPO 1984, 481) it was not immediately apparent that the viscosity value given in any of the examples was "not so closely associated with the other features of the example as to determine the effect of that embodiment...as a whole in a unique manner and to a significant degree".
- (d) Regarding the introduction of D4 into the proceedings by the opposition division, the Board considered that this document now formed part of the proceedings.
- (e) The question of introduction of D5-D9 would be a matter for possible discussion at the oral proceedings.

X. In a letter dated 11 November 2010 the respondent/opponent objected to the number of auxiliary requests filed, arguing this was "clearly not acceptable".

- (a) The arguments presented by the appellant/patent proprietor regarding the admission of D4 to the procedure were disputed (see section VII.(a), above). The opposition division had the discretion to decide under Art. 114 EPC whether to allow a late filed document into the procedure. Since the

opposition division had decided to do so, the decision to admit this document was no longer disputable.

D5-D9 had been filed in response to the evidence and arguments presented in the appeal and consequently could not have been submitted earlier.

- (b) Objections pursuant to Art. 56 EPC were maintained in respect of the main request, reference being made to the earlier submissions (see section VI.(d), above).

XI. With a letter dated 12 November 2010 the appellant/patent proprietor filed amended sets of claims constituting a main request and 23 auxiliary requests.

The main request and first to sixth auxiliary requests corresponded to those previously submitted whereby the respective claims 1 of thereof had been amended by insertion of the wording "for casting", reference being made to original claim 5 for support.

Thus the relevant parts of the claims read:

"...lens formed by casting the polyurethane resin composition **for casting** comprising..." (emphasis of the Board).

The 7th-23rd auxiliary requests had been reordered, whereby in all of these requests claim 1 had been amended in the same manner as indicated for the main and first to sixth auxiliary requests. The further details of the 7th-23rd auxiliary requests are however not of relevance for this decision.

- (a) Regarding the features derived from the examples, in particular the viscosity the appellant/patent proprietor argued:

- It was established practice and case law of the EPO that these features complied with the requirements of Art. 123 EPC since it was readily apparent that these had to be considered as general features, i.e. were not linked to any specific compositions as defined in the examples;
 - The argumentation submitted in the letter of 28 July 2008 (statement of grounds of appeal - see section V, above) and 25 May 2010 (see section VII, above) clearly demonstrated that the incorporation of these features had to be regarded as admissible in terms of Art. 123 EPC.
- (b) Objections to the admission of D4 and D5-D9 were maintained.
- (c) With regard to Art. 56 EPC in addition to referring to the previously submitted argumentation the appellant/patent proprietor submitted:
- Prior to the patent in suit many kinds of soft and hard polyurethane resins had been known;
 - High hardness and high impact resistance were required for impact resistant lenses;
 - If hardness of the resin was too high, shock resistance tended to decrease due to increased brittleness;
 - The polyurethane resin underlying the invention in suit provided a good balance between hardness and elasticity so that it was suitable for impact resistant lenses.

In response to the comments of the Board in its preliminary opinion (see section IX.(b), above) above) it was submitted:

- If a monomer was mixed with a curing agent in the form of diamine as is, i.e. without prepolymerisation the reaction would be too rapid, leading to extremely short pot life making formation of a lens by casting impossible and providing a product that was too brittle;
- According to the invention in suit the prepolymer and diamine (MOCA) were subjected to additional polymerisation, whereby the polymerisation rate was very slow so that an extended pot life was obtained;
- This effect was achieved due to the specific nature of the prepolymer (determined by molar ratio of polyisocyanate and polyhydroxy compound, the viscosity and the average molecular weight), which also influenced the physical properties of the lens due to the nature of the specific diamine (MOCA);
- In particular, MOCA improved resistance to discoloration, durability, hardness and chemical resistance;
- In D3 MOCA was used for windshields for motorcycles, however MOCA had never previously been used for spectacle lenses;
- Only by the specific combination of prepolymer and diamine curing agent could a lens material having the required viscosity and sufficiently long pot life and providing a lens having various excellent properties

including impact resistance, resistance to discoloration, durability, hardness and chemical resistance be obtained;

- This showed that the viscosity of the prepolymer and duration of the pot life were important parameters in order to obtain the desired impact resistant polarized lens;
- In D1 the pot life was short (less than 15 minutes) and it would be impossible to produce a sufficiently impact resistant polarized lens;
- D1 was completely silent about MOCA - the curing agent used in D3 - even though these were from the same inventor. This indicated that the inventor knew that MOCA could not be used in the invention of D1;
- D4 referred exclusively to thiourethanes. This was because only thiourethanes had been available as polyurethanes for lenses in the application year of D4 (1996), which predated D1 and the patent in suit;
- Thiourethanes were intrinsically different from the urethane prepolymers specified in the operative claims. Consequently D4 could not suggest the claimed subject matter.

XII. Oral proceedings were held before the Board on 15 December 2010.

(a) Main request

- (i) The appellant/patent proprietor emphasised that the two important features - polarizing element and the specific composition - were interrelated and that it was consequently not correct to deal with these separately.

A critical aspect was that the lens material could be filled into the mould to produce a clear lens free of bubbles whilst avoiding damage to the fragile polarizing film.

The formation of the lens was a slow process taking a whole day.

The experimental results in the patent in suit and in the enclosures submitted during the course of the opposition and appeal procedures showed that the claimed materials provided sufficient pot life and adequate quality of the lenses.

D1 was the closest prior art as it referred to polyurethane compositions which could be used for a variety of purposes including ophthalmic or sun lenses but did not disclose either the specific composition or the presence of polarizing elements.

D4 did not disclose the material according to the claims in suit. The approach to protect the polarizing element in D4 - applying a hard coating - was different from that taken in the patent in suit and did not provide any pointers to optimise the polyurethane composition in order to provide the lenses.

D3 did not relate to lenses, let alone polarized lenses, at all. Although D3 disclosed polyurethanes with the required crosslinker, there was no incentive to consider the teaching of D3 when faced with the technical problem of D1.

D3 was disclosed in D1 as background art and not as part of the invention of D1.

(ii) The respondent/opponent noted that the chemical composition of D3 was identical to that according to the operative claim; consequently D3 should be considered the closest prior art. Both the principal properties addressed by the appellant/patent proprietor - optical clarity and impact resistance - were also addressed in D3, as was the problem of providing articles with low haze and being free of bubbles. Thus the only difference was the final product formed.

D4 taught how to make polarized lenses, and disclosed the same process as the patent in suit. Thus together D3 and D4 provided all the information necessary to prepare polarized lenses as defined in the operative claim.

The teaching of D3 was incorporated by reference into D1, meaning that these teachings had to be considered together. Enclosure D showed that a polyurethane material that fell entirely within the scope of claim 1 did not result in a polarized lens due to the presence of bubbles. This demonstrated that the problem defined could not be solved over the entire scope of claim 1.

The objective problem could only be formulated as to provide an alternative. From D1 and the reference therein to D3 it was obvious that this could be solved by combining the teachings of D1 and D3 and with reference to the teaching of D4 showing

how to prepare polarized lenses.

For providing merely an alternative optical clarity was not required.

- (iii) The appellant/patent proprietor responded that the reference to D3 in D1 meant only that the compositions of D3 were also suitable for the preparation of ballistic shields, but not necessarily that these were equivalents to the materials of D1. D3 was limited to protective shields whereas D1 related to a broader range of products including ophthalmic lenses. Since D3, despite the similarity in the compositions, did not relate to the same end use it did not qualify as closest state of the art.

The experimental evidence showed that the compositions of D3 were not suitable to prepare polarized lenses. The comparative examples confirmed that high viscosity materials were not suitable. This was however a matter of Art. 83 EPC not Art. 56 EPC since the patent provided sufficient information and guidance to explain which compositions had to be used.

Even if the technical problem were formulated as providing merely an alternative there still would have been no reason to consult D3 since this has no relationship to lenses. The requirement for low viscosity was clearly disclosed by the examples and comparative examples of the patent in suit, reference being made to example G. The wording of the claim "resin

for casting" imposed the necessary viscosity restriction when taking account of the examples.

- (iv) The respondent/opponent observed that the patent proprietor was attempting to impose a limitation on the term "for casting" which was neither in the claim nor in the specification. Thus "for casting" did not have a clear meaning and the requirement that the lens produced be free of bubbles and distortions relied on features which were not present in the claim.
 - (v) After deliberation the Board announced that the main request was refused.
- (b) First and second auxiliary requests
- (i) The appellant/patent proprietor submitted, with reference to its written submissions (see section XI.(a), above) and to T 201/83 (cited by the Board in its communication - see section IX.(c), above) that in the specific circumstances of the patent in suit it was admissible to isolate the values of viscosity from the particular experimental circumstances in which they had been obtained.
 - (ii) The respondent/opponent disputed that the viscosity values could be generalised and isolated since they were intimately linked to the specific features of the compositions in the examples. The application as filed contained no general teaching of a range of viscosity values. In addition, claim 1 of the first auxiliary request defined the polyhydroxy compound only very generally.

Examples 5 and 6 - employing polyester as the polyhydroxy compound - had significantly higher viscosities than examples 1-4, which employed polyethers. There was no evidence that the higher viscosity ranges could be obtained with polyethers. Similarly there was a lack of disclosure for low viscosity compositions based on polyesters.

- (iii) After deliberation the Board announced that the first auxiliary request was refused pursuant to Art. 123(2) EPC.

Further the Board expressed its view that since claim 1 of the second auxiliary request also specified the viscosity range, the same conclusion would have to apply *mutatis mutandis*. This view was not contested by the appellant/patent proprietor. Accordingly the second auxiliary request was also refused.

- (c) Third auxiliary request.

- (i) The appellant/patent proprietor explained that the sole claim of this request was a combination of claims 1 and 2 of the main request whereby the polyhydroxy compound had been restricted to polyether. This subject matter was clearly distinguished from the disclosure of D3 requiring a polyester diol. The examples relating to this embodiment demonstrated that a lens could be obtained. Applying the problem solution approach, D1 represented the closest prior art. The definition of the polyhydroxy compound as being a polyether provided a further distinguishing feature.

The problem was to provide a suitable impact resistant high quality polarized lens which could be produced in a safe and reliable manner. As shown by the data in the patent in suit and that subsequently submitted, this problem had been solved by the claimed subject matter.

D1 contained no reference to a polarized lens or any discussion of problems associated with the provision of such.

- (ii) The respondent/opponent noted that the patent in suit contained no single example relating to polarized lenses; there was no data showing whether polarized lenses could even be obtained following the teaching of the patent in suit; there was no evidence of any technical effect associated with the use of the polyether polyol.

Since the use of polyetherpolyols in such compositions was known from both D1 and D3 this feature could not support an inventive step.

Starting from D1 the only difference was the nature of the crosslinker. This gave an effect regarding the pot life which however was not a feature of the product. This was not even surprising since this was known from D5, which also taught that the curing agents of D1 suffered from critically short pot lives.

Although D5 did not address the same problem as the patent in suit it taught that MOCA provided longer pot life.

Since the technical problem underlying the

patent in suit was to find an alternative composition to those of D1, having longer pot life in order to make high quality lenses, the opponent requested that D5 be admitted. In this connection, it noted that the appellant/patent proprietor had been permitted to present arguments based on data submitted for the first time during the appeal proceedings, and that D5 had been submitted *inter alia* in response to these data in particular in view of the pot life obtainable with the various crosslinkers. Thus D5 could not be considered to be late filed.

- (iii) With respect to the admissibility of D5 the appellant/patent proprietor referred to its written submissions. Further the main focus of D5 was on finding a replacement for MOCA. The interpretation of D5 adopted by the respondent/opponent was diametrically opposed to the thrust of the teaching thereof.
- (iv) Following deliberation the Board announced that D5 was admitted to the proceedings.
- (v) The respondent/opponent, with respect to D1 as the closest prior art submitted that it was self evident that a composition which had a longer pot life would stay stable for longer meaning that gas could be removed from the system. Thus it was not surprising that increasing the pot life improved the clarity of the lens. This was in particular evident in view of the examples of the appellant/patent proprietor showing that

there were problems filling a mould with high viscosity materials.

Based on D3 as the closest prior art the only problem was to provide alternative optically clear impact resistant articles. D4 provided the information necessary to produce polarized lenses. Hence it required no inventive activity to produce polarized lenses from the compositions of D3.

Even starting from D1 the conclusion would be the same: the skilled person would be directed to employ MOCA in order to avoid problems associated with short pot life. Regarding the fact that D5 taught MOCA for use in elastomers the respondent/opponent submitted that the border between elastomeric and non-elastomeric compounds in particular in the case of the technology under consideration was diffuse. Hence it could not be concluded that this distinction would prevent the skilled person from consulting D5 when seeking to provide lenses. The reason why D1 failed to mention MOCA was clear - as shown by D5 this material represented a health hazard. Nevertheless, this material did enable longer pot lives to be achieved.

- (vi) The appellant/patent proprietor queried why, if MOCA was commonly used for polyurethanes, it was not mentioned in D1 and posited that this was due to the specific nature of elastomers. The shields of D3 required a combination of elastomeric and optical properties. D1 was focussed principally on

armour applications and contained no examples of lenses. Any submissions of the respondent/opponent why MOCA was not mentioned in D1 were pure speculation. There was no clear motivation in D5 specifically to select MOCA when producing polarized lenses. Further the hardness properties reported in D1 and D5 showed possible distinctions between elastomeric products and lenses.

XIII. The appellant/patent proprietor requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request or of one of the 1st to 23rd auxiliary requests in that order.

The respondent/opponent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.
2. *Documents in the proceedings*
 - 2.1 D4 (JP-A-9-258009)
 - 2.1.1 This document was filed by the opponent with its second submission during the opposition proceedings, i.e. after expiry of the nine month opposition period (see section II, above). Accordingly this document had not been filed in due time (Art. 99(1) EPC).

- 2.1.2 The opposition division exercised its discretion to admit this document to the procedure (see section III.(a), above).
- 2.1.3 The admission of this document has been challenged by the appellant/patent proprietor (see section V.(a), above).
- 2.1.4 The question to be considered by the Board is whether the opposition division exercised its discretion correctly, i.e. in a reasonable way and according to the right principles (cf G 7/93 (OJ EPO 1994, 775), reasons 2.6 and T 640/91 29 September 1993, not published in the OJ EPO, reasons 6.3, last sentence). However it is not the function of the Board to review all the facts and circumstances of the case as if it were in the place of the opposition division (see above cited G 7/93, T 640/91 and also T 1008/96 of 25 June 2003, not published in the OJ EPO Reasons 2.3 and 2.4).
- 2.1.5 As follows from the extensive body of case law developed in this respect (e.g. decision T 1002/92, OJ EPO 1995, 605), an essential condition to be met is whether the late submission was (*prima facie*) highly relevant or not. The opposition division considered this in section 3 of the decision under appeal and came to the conclusion that this condition was met.
- 2.1.6 Accordingly the Board is satisfied that the opposition division exercised its discretion to admit D4 to the procedure according to the correct principles and in view of the analysis in a reasonable manner.

- 2.2 D5 was cited by the respondent/opponent in its rejoinder to the statement of grounds of appeal.
- 2.2.1 This document relates to MOCA (designated "MBOCA" in D5), i.e. the aromatic amine specified in the operative claim and is directed to finding replacements for this. Among those compounds considered is "M-CDEA" (4,4'-methylenebis (3-chloro-2,6-diethylaniline) - discussed in Table 6 of D5 - which is one of those discussed in D1, and employed in some examples thereof.
- 2.2.2 Thus D5 provides in a single document data relating both to the subject matter of the patent in suit and that of one of the documents identified in the proceedings as being highly relevant prior art.
- 2.2.3 Under these circumstances the Board can discern no reason not to conclude that this document is *prima facie* highly relevant (cf the aforementioned T 1002/92, reasons 3.4).
Accordingly D5 was admitted to the proceedings.

3. *The patent in suit - the technical problem*

The object of the patent in suit is to provide an impact resistant optical lens, in particular a polarized lens which has good resistance to discoloration and durability (paragraphs [0012] and [0020]).

According to the description and the claims of the patent in suit this problem is solved by providing an optical lens by casting a polyurethane resin as

specified in claim 1 and described in paragraphs [0015]-[0024].

The polyurethane resin is obtained by reacting an alicyclic polyisocyanate with a polyhydroxy compound. The NCO terminated prepolymer obtained is cured with a specific aromatic polyamine compound, namely 4,4'-methylene-bis(2-chloroaniline), i.e. "MOCA" (patent in suit paragraphs [0015]-[0018]) which is the diamine specified in all pending requests.

The polyhydroxy compound employed is discussed in detail in paragraphs [0024]-[0026] where it is taught that either polyether diols or polyester diols having average molecular weight of 700-1200 may be employed. Paragraph [0026] explains that the prepolymer obtained from a polyester diol has higher viscosity than the prepolymer obtained from a polyether diol and that consequently polyether diols are preferred because of easy casting.

Paragraph [0029] explains that if the values for the ratio of NCO/OH (2.5-4.0) and NCO content (7.0-14.0 %) of the prepolymer are below the indicated ranges then the viscosity becomes so high that casting would be difficult and low hardness would result. If these values are above the specified ranges the physical properties become poor.

The manufacture of the lens is explained in paragraph [0032]:

- A mould is provided by fixing convex and concave moulds liquid-tightly through a gasket;
- Monomer is injected into the cavity between the two mould parts to polymerise and cure it;
- In preparing a polarized lens a polarizing element (film) is set in the gasket beforehand;

- The resin raw material is then injected through an injection hole into the mould member so that it will cover both surfaces of the polarized element.

4. *The prior art*

4.1 D1 (US-A-6 127 505) relates according to claim 1 to a transparent, non-elastomeric, high hardness impact resistant polyurethane material which is the reaction product of:

- A polyurethane prepolymer prepared by reaction of a (cyclo)aliphatic diisocyanate with a hydroxy containing compound of molecular weight 400 to 2000 selected from, *inter alia*, polyether glycols and polyester glycols in an equivalent ratio of 2.5 to 4.0 NCO/OH and
- An aromatic amine, the definition of which excludes MOCA.

According to claim 2 a second aromatic diamine may be present, the definition of which likewise excludes MOCA. In column 1, lines 30-37 D1 refers to "US Pat. No. 3,866,242", i.e. D3 in the present proceedings, indicating that this document is "incorporated herein by reference".

D1 discloses in column 2 lines 4-10 that the compositions thereof are useful for transparency applications requiring excellent impact resistance and high heat distortion temperatures, the following applications being explicitly mentioned: architectural glazings, vehicle glazings, riot shields, aircraft canopies, face masks, visors, ophthalmic and sun lenses, protective eyewear and transparent armour.

Polarized lenses are not mentioned.

The examples of D1 report polyurethanes derived from polyester glycols or polycarbonate glycols.

Among the curing agents disclosed as useful in the description (columns 4-5) and the examples are "Ethacure 100" (2,4- or 2,6-diamino-3,5-diethyl-toluene and mixtures thereof), "Lonzacure M-DEA" (4,4'-methylenebis 2,6-diethyl aniline) and "Lonzacure M-CDEA" (4,4'methylenebis(3-chloro 2,6-diethyl aniline), i.e. one of the compounds considered in D5 (see section 2.2, above).

The prepared materials are evaluated for their optical, hardness, solvent resistance, heat distortion and ballistic properties (col. 9 lines 25-27).

4.2 D3 (i.e. the above-mentioned US-A-3 866 242) is directed to a protective shield, e.g. a ballistic resistant shield or a windshield for a motorcycle. The shield is based, according to claim 1, on the reaction product of polyurethane prepolymer prepared from either a polyether glycol or polyester glycol of 700 to 1000 molecular weight and methylene bis(cyclohexyl isocyanate), i.e. one of those isocyanates specified in the patent in suit in an equivalent ratio of 2.7 to 4.5 NCO/OH. According to col. 1 lines 52, 53 and example 1 of D3 the curing agent is the diamine MOCA. The examples of D3 prepare a clipboard and evaluate *inter alia* light transmission, haze, elongation and hardness. There is no reference in D3 to optical lenses of any kind.

4.3 D4 relates to the preparation of polarized lenses. Among the polymers proposed for preparing the lenses in paragraphs [0021] and [0022] of D4 are polyurethane

based resins whereby the only example of urethane based lenses specifically mentioned is thiourethane polymer (paragraph [0022]) which is also employed in working example 2 thereof. Two methods of preparing the lens are discussed in D4.

According to "Method 1" - discussed starting at paragraph [0024] and exemplified in Working Examples 1, 2 and 4 of D4 a preformed lens is adhered to a polarizing film by means of a light sensitive adhesive, The formation of the lens itself is not part of this method. The lenses employed are prepared from allyl diglycol carbonate (Working Example 1), or a not further specified "plastic" (Working Examples 2 and 4), and consequently not any form of polyurethane. Although in the general discussion of Method 1 there is, in paragraph [0027] a reference to "urethane-based resins" this is in the context of the adhesive employed to bond the polarizing film to the preformed lens, but not as material for forming the lens itself.

A further method - "Method 2" - is described starting at paragraph [0029] and exemplified in Working Example 3 of D4, which method has the following steps:

- Lens made by cast polymerisation;
- The polarizing film either fitted to the mould and bent to match the curvature of the mould. Alternatively if the film is of sufficient strength it can itself form one of the mould members;
- The mould having a second part and
- A gasket or tape;
- The monomer being injected into the mould, and polymerised;

D4 however fails to specify in general terms the polymer employed in this casting process. In the

Working Example a copolymer prepared of a styrenic comonomer and a methacrylic comonomer is employed, i.e. not a polyurethane of any kind. D4 does not provide any detailed considerations of the conditions and constraints that apply to the moulding compositions employed in said "Method 2".

4.4 D5, discussed above, relates to the use of MOCA (designated "MBOCA" in this document) in the manufacture of polyurethane, in particular elastomers. D5 notes in the passage bridging pages 219 and 220 that although MOCA is "generally regarded" as being the most advantageous diamine for the manufacture of polyurethane elastomers, it suffers from a number of disadvantages, namely:

- Tendency to decompose upon standing;
- Toxic;
- Ames positive, i.e. carcinogenic.

Accordingly the aim of D5 was to identify alternative amines which would overcome these disadvantages.

Among the alternatives investigated are, as mentioned above, M-CDEA (designated "amine 5" in D5) i.e. one of those compounds preferred in D1. On page 228 a comparison of this with MOCA is presented. Specifically M-CDEA leads to cured products having:

- Greater hardness;
- Better tear strength.

Further M-CDEA:

- Could be employed in lower quantities than MBOCA to obtain the same physical properties;
- Was more reactive than MOCA and had shorter pot life.

5. *The experimental evidence*

5.1 *In the patent in suit*

Manufacturing examples 1-6 prepare polyurethane prepolymers whereby manufacturing examples 1-4 employ a polyether diol (polyoxytetramethylene glycol) of molecular weight 1014 as the polyhydroxy compound and manufacturing examples 5 and 6 employ a polyester diol (1,6-hexanediol adipate) of similar molecular weight, namely 1007. Consistently with the statement made in paragraph [0026] of the patent in suit (see section 3, above) the prepolymers A, B, C and D, derived from polyetherdiols, had viscosities of 750, 920, 900 and 1200 mPA.s/60°C respectively which were lower than those of prepolymers E and F, derived from polyester diols (2000 and 2100 mPa.S/60°C respectively).

Manufacturing example 7 related to a prepolymer prepared from the polyether glycol employed in examples 1-4. This prepolymer however had a NCO content of 5.5%, which was below the minimum specified in the patent in suit as being preferable (cf section 3, above).

Consistently with the teaching of paragraph [0029] of the patent in suit this prepolymer had a higher viscosity than those prepolymers having NCO contents within the preferred range.

According to the examples all of the compositions prepared in manufacturing examples 1-6 were evaluated as having "good" casting processability, and pot lives ranging from 35-60 minutes.

The composition based on the prepolymer of comparative example 7 was recorded as having "bad" casting processability, despite having a pot life of 50 minutes. None of these examples relates to polarized lenses, but only to moulded articles of non-defined form.

5.2 *Evidence submitted during the opposition proceedings:*

In the letter dated 11 December 2007, resubmitted as Enclosure A together with the statement of grounds of appeal (see section V, above), the patent proprietor reported experiments in which the prepolymer employed in example 1 of the patent in suit, i.e. that prepared in "Manufacturing Example 1" was employed with a number of the curing agents disclosed in D1, namely M-CDEA, M-DEA and "Ethacure 100" (see section 4.1, above for details of the chemical constitution of these compounds). These experiments resulted in pot lives of 5, 1 and 1 minutes respectively which according to the submissions of the patent proprietor were not suitable for the production of polarized lenses.

5.3 *Submitted during the appeal proceedings*

In Enclosure D, submitted together with the statement of grounds of appeal (see section V, above) the appellant/patent proprietor provided further experiments.

Two prepolymers were prepared, both based on 4,4-methylene-bis (cyclohexyl isocyanate).

"Prepolymer (1)" employed a polyester (ϵ -caprolactone hexanediol) of average molecular weight 700-1000 as the polyhydroxy compound, whilst "Prepolymer (2)" employed

a polyether, namely polyoxytetramethylene glycol of average molecular weight 1014.

In both cases the ratio of NCO/OH employed was 3/1. The NCO contents of the polymers were 10.2 and 10.1 % by weight respectively.

The polyester based Prepolymer (1) was employed in examples designed to represent reproductions of Example IV of D1 (designated "Test Example 1") and Example 1 of D3 ("Test Example 2") whilst Prepolymer (2) - derived from polyether - was employed in a reproduction of example 2 of the patent in suit ("Control Test Example 1").

According to "Test Example 1", i.e. employing Prepolymer (1) (polyester based), when using either Ethacure 100 or M-DEA as the curing agent too rapid curing meant moulding was not possible.

Although moulding of a lens was "possible" when employing M-CDEA as the curing agent, bubbles remained rendering the obtained product useless as a polarized lens.

According to "Test Example 2" - i.e. the reproduction of example 1 of D3 employing Prepolymer (1) and the diamine MOCA, even though a lower temperature and longer time were employed than specified in D3 (in order to reduce the incidence of bubbles) and whilst moulding was "possible", bubbles remained in the product meaning that the article produced was also useless as a polarized lens.

Finally in "Control Test Example 1" of Enclosure D employing Prepolymer (2), i.e. that based on a

polyether and corresponding to example 2 of the patent in suit and MOCA as the curing agent a lens free of bubbles and hence which was usable as a polarized lens was obtained.

5.4 *Analysis of this experimental evidence*

5.4.1 Both the prepolymers employed in the experiments reported in Enclosure D were based on components which according to the description of the patent in suit are preferred and in amounts such that the ratio of NCO/OH and the NCO content were likewise within the ranges identified as preferred in the patent in suit. However although "Test Example 2" of Enclosure D employed a preferred - polyester-based - prepolymer and the preferred curing agent it was not possible to obtain a product that was usable as a polarized lens due to the presence of bubbles. In contrast, when a prepolymer based on a polyether polyol was employed a bubble free moulding was obtained which was thus usable as a lens ("Control Test Example 1").

5.4.2 This evidence is consistent with statements made by the appellant/patent proprietor in the description of the patent (paragraph [0026]) and on page 6 of its letter of 25 May 2010 (see section VII.(d), above) that polyether polyols were preferred since the lower viscosity permitted easier casting.

5.4.3 In view of the foregoing evidence it has to be concluded that the problem set out in the patent in suit of making polarized lenses is solved only in the case that a polyurethane prepolymer obtained from

polyether polyol is employed. However the evidence also shows that this problem is not solved when a prepolymer based on a polyester polyol is used, even though this embodiment is also stated to be preferred in the patent in suit.

6. Main request

6.1 Art. 123(2) and (3) EPC

The features of claim 1 are derived from the original application as follows:

"An impact resistant polarized optical lens formed by casting the polyurethane resin composition for casting...": claims 5 and 6.

"...comprising a polyisocyanate, a polyhydroxy compound...": claim 1.

"...and 4,4'-methylene-bis(2-chloroaniline...": Claim 3.

"...wherein said polyisocyanate is 4,4'-methylene-bis(cyclohexylisocyanate) or isophorone diisocyanate; and...": claim 1.

"...wherein said polyisocyanate and said polyhydroxy compound are reacted so that the reaction molar ratio of said polyisocyanate to said polyhydroxy compound (NCO/OH) is 2.5 to 4.0 and the NCO content of a polyurethane prepolymer obtained is 7.0 to 14.0%...": claim 4.

Claim 2 corresponds to claim 2 as originally filed, whereby it is noted that the term "diol" has -

apparently inadvertently - been omitted after the term "polyether".

Consequently the claims of the main request meet the requirements of Art. 123(2) EPC.

Claim 1 is restricted compared to claim 1 as granted due to the specification of a polarized lens, the definition of the diamine and the features relating to NCO/OH ratio and NCO content.

Accordingly the requirements of Art. 123(3) EPC are satisfied.

6.2 Art. 84 EPC.

The respondent/opponent objected to the clarity of the term "...polyurethane resin **for casting**..." (emphasis of the Board, see section XII.(a).(iv), above).

Compared to claims 1 and 4 as granted the operative claim differs by the introduction of the emphasised phrase, i.e. "for casting". Since Art. 84 EPC is not a ground of opposition examination of compliance of this request with this requirement of the EPC must be restricted to the wording "for casting" and its interaction with the other features of the claim. According to paragraph [0014] of the original description (references are to the published application), corresponding to paragraph [0016] of the granted patent the term "resin composition for casting" has to be understood that first an isocyanate functional prepolymer is obtained by reacting an alicyclic polyisocyanate with polyhydroxy compound and that this composition was then cured with a specific

aromatic polyamine. From this it is understood that "the composition for casting" contained the stated prepolymer and polyamine crosslinker.

Thus when interpreting this term of the claim in the context of the whole disclosure the meaning thereof is unambiguous (see also the summary and overview given in "Case Law of the Boards of Appeal of the European Patent Office", 6th edition, Section II.B.5.3.1).

Accordingly the subject matter of claim 1 of the main request meets the requirement of Art. 84 EPC.

However this is the full extent of the meaning that can be attached to the wording "for casting" in the light of the description. In particular the wording imposes no restrictions regarding properties such as viscosity, pot life etc.

6.3 Art. 54 EPC

Novelty of the subject matter of the main request was not challenged by the respondent/opponent.

Nor is the Board aware of any grounds for raising objections under this provision of the EPC since no document cited in the proceeding discloses a polarized lens as specified in claim 1.

Consequently novelty is acknowledged.

6.4 Art. 56 EPC

6.4.1 As explained in the foregoing section 3 the object of the patent in suit is to provide a polarized optical lens.

6.4.2 Two documents have been cited in the procedure which relate to the production of lenses.

As explained in section 4.1, above D1 relates in one aspect to lenses although polarized lenses are not mentioned even generally and no specific examples of lenses are provided. This document employs polyurethane prepolymers of the type specified in claim 1 of the main request but with different curing agents.

D4 relates to the production of polarized lenses. However the only urethane polymer mentioned is a thiourethane which is excluded from the scope of the operative claim. Further as explained in section 4.3, above D4 provides no detailed information relating to the step of actually preparing a lens from this - or any other - material or the requirements placed on the moulding material.

Since claim 1 of the main request is directed to a lens formed by casting a polyurethane composition and in view of the closer similarity between the polyurethane composition employed, D1 has to be considered as the closest prior art for this subject matter.

6.4.3 *The technical problem with relation to D1*

As explained in the foregoing section 5, the evidence shows that the aim of obtaining a polarized lens can be achieved when employing a polyurethane prepolymer derived from a polyether diol.

In contrast, when a prepolymer derived from polyester polyol is employed, whilst it is "possible" to mould the composition, the resulting article is not usable as a lens due to the presence of bubbles.

6.4.4 Claim 1 of the main request however covers both possibilities.

In the light of the evidence the objective technical problem to be solved by this subject matter has to be formulated in minimalist terms, namely as being to provide a further article - regardless of its quality or suitability for any particular use.

6.4.5 This problem was solved according to operative claim 1 by providing a polarized lens.

6.4.6 The preparation of polarized lenses by casting is known in the prior art as witnessed by D4, albeit in general terms. Hence the feature that a polarized lens is produced cannot on its own provide support for an inventive step.

6.4.7 D1 refers in its introduction to D3, which as explained in section 4.2, above relates to shields prepared by curing polyurethane prepolymers prepared from either polyester polyols or polyether polyols with MOCA i.e. the amine specified in operative claim 1.

6.4.8 In view of the minimalist objective problem (see section 6.4.4, above) any teaching can be invoked even one, such as D3, which neither relates to lenses in any form nor is identified in D1 being of any particular significance or relevance.

6.4.9 Accordingly D1 already suggests a route to solve the above formulated - minimalist - problem.

6.4.10 The subject matter of the main request therefore provides an obvious solution to this technical problem.

Consequently the subject matter of the main request does not meet the requirements of Art. 56 EPC.

6.5 The main request is refused.

7. *First auxiliary request*

Claim 1 of this request differs from claim 1 of the main request in that it specifies that the polyurethane prepolymer has a viscosity of 750 to 2100 mPa.s at 60°C (see sections V.(a), VII and XI, above).

7.1 *Art. 123(2) EPC*

There is no general disclosure in the application as filed of a range of viscosity for the polyurethane prepolymer but only disclosures of specific, individualised viscosity values in each of the examples (see section 5.1, above).

The lower viscosity value specified in claim 1 of the first auxiliary request is disclosed in manufacturing example 1, relating to a prepolymer derived from a polyether polyol. The upper value is derived from manufacturing example 6, relating to a prepolymer derived from a polyester polyol.

According to the pertinent case law, in particular T 201/83 an amendment [of a range] is permissible on the basis of a particular value described in a specific example if the skilled person could have readily recognised that this value was not so closely associated with the other features of the example as to determine the effect of that embodiment in a unique

manner and to a significant degree (T 201/83, point 12 of the reasons).

In the present case however there is no range of viscosities disclosed as such in the application as filed but only individual values of specific examples (see section 5.1, above). Furthermore - and as explicitly acknowledged in paragraph [0026] of the patent in suit and acknowledged in the appellant/patent proprietor's letter of 25 May 2010 (see section VII.(d), above) the viscosity is the consequence of the particular constitution of the examples. This property varies not only as a function of the proportions of isocyanate and hydroxy functions reacted but also due to the nature of the polyhydroxy compound employed (polyether or polyester respectively) to the extent that the notionally constructed ranges of the viscosities of the prepolymers derived from each type of polyhydroxy compound do not even overlap (see section 5.1, above).

Thus the range of viscosities specified in claim 1 of the first auxiliary request has been constructed by the steps of:

- extracting values from individual examples which values as stated explicitly in the patent in suit and confirmed by the submissions of the appellant/patent proprietor, are closely associated with at least one feature of the relevant compositions of the exemplified compositions, namely the nature of the polyhydroxy compound and
- using the values so extracted to create a range which has as its upper and lower limits the

maximum and minimum viscosity values encountered in the examples.

In view of this situation, and even with the application of the findings of T 201/83, the construction of a range by taking values from the two groups of examples where there was no range and then limiting this range by individualised values taken from these examples as upper and lower limits respectively, constitutes subject matter extending beyond the content of the application as filed, contrary to Art. 123(2) EPC.

7.2 Since claim 1 of the first auxiliary request does not meet the requirements of Art. 123(2) EPC this request is refused.

8. *Second auxiliary request*

The sole claim of this request is a combination of claims 1 and 2 of the first auxiliary request. Consequently this claim also specifies the range of viscosity found to be objectionable in the first auxiliary request (Art. 123(2) EPC).

For the same reasons this request is also refused.

9. *Third auxiliary request*

The sole claim of this request is a combination of claims 1 and 2 of the main request, with the further limitation that the polyhydroxy compound is restricted to a polyether diol.

9.1 *Art. 54, 84 and 123(2) EPC*

For the reasons explained with respect to the main request the requirements of Art. 54, 84 and 123(2) are satisfied (see section 6, above).

9.2 *Art. 56 EPC*

9.2.1 In contrast to the main request the claim of the third auxiliary request is restricted to that embodiment which according to the evidence is capable of providing polarized lenses of a quality which means that they can be used as such.

9.2.2 For the reasons as set out with respect to the main request, the closest prior art is D1 (see section 6.4.2, above).

The objective technical problem to be solved with respect to D1 can be formulated, in accordance with that set out in the patent in suit, as being to provide an impact resistant polarized lens usable as such.

9.2.3 In contrast to the main request (see section 6.4.3, above) this problem is solved according to operative claim 1 by employing a polyurethane prepolymer derived from a defined polyether diol in combination with a specific cross-linking agent, i.e. MOCA.

9.2.4 As is clear from the evidence filed in particular as Enclosure D, "Control Test Example 1", it is plausible that the claimed measures are effective to solve the relevant technical problem (see sections 5.3 and 5.4, above) since the ability to produce an effective polarizing lens depends on having a moulding

composition with a low viscosity and a long pot life, which is itself provided by the combination of polyether polyol and cross-linker according to claim 1.

9.2.5 It is recalled that D1 does not relate to the production of polarized lenses (see section 4.1, above). Further, the examples of D1 relate exclusively to compositions which differ from those of the operative claim:

- The prepolymers are derived from polyester polyols or polycarbonate glycol. There is no example employing a polyetherpolyol based prepolymer together with curing agents, although according to column 3 line 10 polytetramethylene glycol is one of the most preferred hydroxy containing compounds of D1;
- The general teaching and examples of D1 relate to different curing agents which, as demonstrated by the evidence of the appellant/patent proprietor, consistently result in faster curing times than are obtained with the curing agent specified in the claim (see section 5, above);
- Thus D1 does not teach the required combination of prepolymer and cross linking agent even in general terms for any purpose let alone for specifically preparing lenses, even less for polarized lenses, which as stated above are not mentioned in D1.

9.2.6 Consequently D1 does not contain any hint to the solution of the technical problem.

- 9.3 Both the opposition division in the decision (see section III.(e)) and the respondent/opponent in its written and oral submissions (see sections VI.(d) and XII.(a).(ii) respectively) however attached great significance to the reference in D1 to D3.
- 9.3.1 D3 is referred to at column 1, lines 30 to 42 of D1, i.e. the part of D1 headed "background". It thus forms part of the acknowledgement of prior art from which D1 departs. It forms no part of the teaching of the invention of D1, which rather focuses on different cross-linking agents from those of D3 (cf section 4.1, above). Consequently the reference to D3 in D1 does not give any hint to modify D1 in the direction of the solution of the technical problem.
- 9.3.2 In any case D3 fails to disclose any kind of lens, let alone a polarizing lens. Consequently even a combination of the relevant disclosure of D3 with that of the teaching of D1 would not lead to a solution to the technical problem.
- 9.4 Although the disclosure of D4 concerns the manufacture of polarized lenses and even mentions polyurethane based resins, the only specifically mentioned polyurethane resin is a sulphur containing polyurethane. Furthermore in the two working examples (Method 1 and Method 2) the lens is either not cast (Method 1) or is cast but the polymer used is not a polyurethane (Method 2) - see section 4.3, above. Thus D4 mentions neither the polyurethanes nor the crosslinking agent required by the solution to the technical problem, nor does it contain any considerations relating to the requirements to be met by the specific casting method characterising

the solution of the technical problem. Consequently it cannot provide a pointer to the solution of the technical problem.

- 9.5 D5, which was introduced to the procedure by the Board (see sections 2.2 and 4.4, above) relates to a discussion of the curing agent specified in operative claim 1 (MOCA) and compares this to certain of the curing agents known from D1 equally cannot provide a pointer to the solution to the technical problem.
- 9.5.1 Firstly, D5 relates to the production of elastomeric compositions, and there is no discussion in this document of the preparation of lenses of any kind.
- 9.5.2 Secondly in D5 it is concluded, consistently with the evidence provided by the appellant/patent proprietor (see section 5, above), that the curing agents preferred according to D1 result in pot lives that are significantly shorter than those obtainable with MOCA.
- 9.5.3 Thus although D5 does teach that the diamine specified in the operative claim provides adequate pot life this teaching is not in the context of the preparation of lenses of any kind, nor even of materials which would necessarily be suitable for use in lenses. Further the core and the entire thrust of the teaching of D5 is the undesirability of using MOCA and the search for alternatives.
- 9.5.4 Consequently D5 is *prima facie* not relevant to the technical problem of the patent in suit, or even to the general technical field to which the patent in suit relates (polarized lenses). On the contrary the

"relevance" of D5 relies on knowledge of the claimed subject matter, i.e. emerges only on the basis of an *ex post facto* analysis.

9.6 Consequently the solution to the technical problem according to the third auxiliary request does not arise in an obvious way starting from D1 as closest prior art.

9.7 Nor would the result be different starting from D3 as closest state of the art.

9.7.1 In this case, the technical problem arising from D3 would be to find a further application for the moulding composition according to D3.

9.7.2 The solution to this technical problem is to apply the moulding composition of example 1 of D3 in the manufacture by casting of a polarized lens.

9.7.3 Clearly D3 itself cannot provide a pointer to the solution of the technical problem because it does not contain a reference to a lens of any kind, let alone a polarized lens.

9.7.4 Furthermore the skilled person starting from D3 would have no reason to consult D1 because, unlike the converse case referred to in relation to D1 as the closest state of the art (sections 9.2 and 9.3 above) there is no reference in D3 to D1.

9.8 Accordingly the subject matter of the sole claim of the third auxiliary request involves an inventive step and consequently satisfies the requirements of Art. 56 EPC.

10. Under these circumstances it is not necessary to consider the remaining auxiliary request numbered 4 to 23.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the basis of the 3rd auxiliary request submitted with a letter dated 12 November 2010 and after any necessary consequential amendment of the description.

The Registrar:

The Chairman:

E. Goergmaier

R. Young